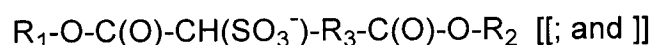


Claims

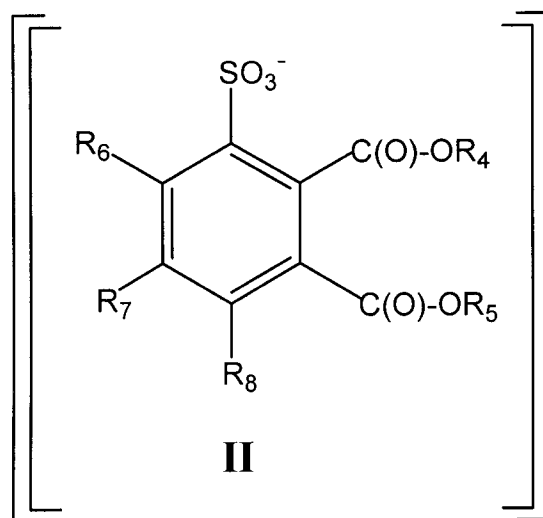
1. (Currently amended) An ionic liquid composition comprising ~~at least about 55 greater than 70~~ weight percent of an ionic liquid comprising:

(a) a quaternary ammonium, phosphonium or sulfonium cation having from about 4 to about 16 carbon atoms; and

(b) an anion ~~selected from the group consisting of~~ having the structure (I):



I



II

wherein R_1 ~~[,]~~ and R_2 ~~[, R₄ and R₅]~~ are independently selected from the group consisting of substituted or unsubstituted alkyl or alkenyl groups;

wherein R_3 is a substituted or unsubstituted alkylene group, heteroarylene group, arylene group, or cycloalkylene group ;

~~wherein R_6 , R_7 , and R_8 are independently selected from H, alkyl, NO_2 , halo, cyano, silyl, and OH;~~

or R_1 and R_2 may be taken together to form a ring;

~~or R_4 and R_5 may be taken together to form a ring;~~

~~or R₆ and R₇ or R₇ and R₈ may be taken together to form a ring, and~~
wherein when any of R₁, R₂, R₃ [, R₄ and R₅] are substituted, the substituent may ~~include~~ be alkyl, NO₂, halo, cyano, silyl and OH groups.

2. (Cancelled)

3. (Currently amended) The composition of ~~Claim 2~~ claim 1 wherein R₁ and R₂ are independently selected from alkyl groups having about five to about eighteen carbon atoms.

4. (Cancelled)

5. (Currently amended) The composition of ~~Claim 2~~ claim 1 wherein R₃ is – (CH₂)_n– wherein n is an integer of from about one to about 10.

6. (Original) The composition of Claim 5 wherein R₁ and R₂ are independently selected from alkyl groups having from about six to about eighteen carbon atoms.

7. (Previously presented) The composition of Claim 6 wherein n is one and R₁ and R₂ are –CH₂–CH(CH₂CH₃)(CH₂CH₂–CH₃).

8-15. (Cancelled)

16. (Original) The composition of ~~Claim 2~~ Claim 1 further comprising a hydrocarbon.

17. (Original) The composition of Claim 7 further comprising a hydrocarbon.

18-21. (Cancelled)

22. (Original) The composition of Claim 1 wherein the cation is a quaternary ammonium or quaternary phosphonium.

23. (Currently amended) The composition of Claim 22 wherein the quaternary ammonium cation is independently selected from the group consisting of substituted or unsubstituted pyridinium, pyridazinium, pyrimidinium, pyrazinium, imidazolium, pyrazolium, thiazolium, oxazolium, triazolium, imidazolinium, methylpyrrolidinium, isothiazolium, isoxazolium, oxazolium, pyrrolium, and thiophenium, wherein when substituted, the substituent group may ~~comprise~~ be one or more of halo, alkyl, and aryl groups, and two adjacent substituents may be joined together to form an alkylene radical to form a ring structure converging on N, and in which the alkyl, phenyl and alkylene groups may be further substituted.

24. (Previously presented) The composition of Claim 1 wherein the quaternary ammonium cation is substituted by groups selected from the group consisting of alkyl and aryl groups.

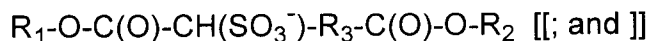
25. (Previously presented) The composition of Claim 22 wherein the quaternary ammonium cation is BMIM (1-butyl-3-methylimidazolium).

26. (Previously presented) The composition of Claim 1 wherein the quaternary ammonium cation is tetrabutyl ammonium, tributylmethyl ammonium, tetrabutyl phosphonium, tetraethyl ammonium, N,N-dialkyl pyrrolidinium, trimethyl-2-hydroxyethyl ammonium, N,N'-dialkyl imidazolium, N-alkylpyridinium, or a mixture thereof.

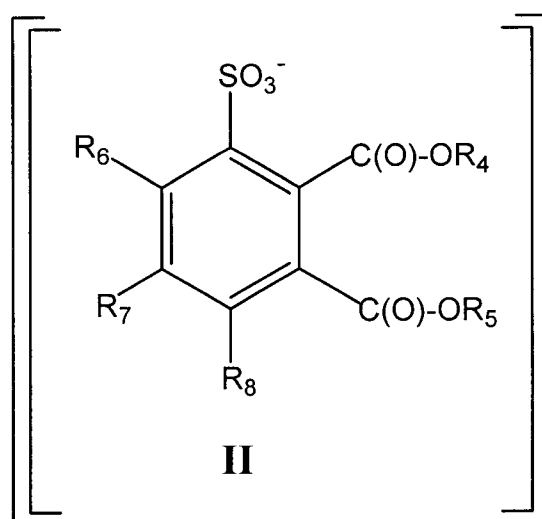
27. (Currently amended) A hydrophobic ionic liquid composition comprising ~~at least about 55~~ greater than 70 weight percent of an ionic liquid comprising:

(a) a quaternary ammonium, phosphonium or sulfonium cation; and

(b) an anion selected from the group consisting of having the structure (I):



I



wherein R_1 [[:] and R_2 [[: R_4 and R_5]] are independently selected from the group consisting of substituted or unsubstituted alkyl or alkenyl groups;

wherein R_3 is a substituted or unsubstituted alkylene group, heteroarylene group, arylene group, or cycloalkylene group ;

~~wherein R_6 , R_7 , and R_8 are independently selected from H, alkyl, NO_2 , halo, cyano, silyl, and OH;~~

or R_1 and R_2 may be taken together to form a ring;

~~or R_4 and R_5 may be taken together to form a ring;~~

~~or R_6 and R_7 or R_7 and R_8 may be taken together to form a ring, and~~

wherein when any of R_1 , R_2 , R_3 [[: R_4 and R_5]] are substituted, the substituent may include be alkyl, NO_2 , halo, cyano, silyl and OH groups.

28. (Cancelled)

29. (Previously presented) The composition of Claim 27 wherein the cation is a quaternary ammonium or quaternary phosphonium.

30. (Currently amended) The composition of Claim 29 wherein the quaternary ammonium cation is independently selected from the group consisting of substituted or unsubstituted pyridinium, pyridazinium, pyrimidinium, pyrazinium, imidazolium, pyrazolium, thiazolium, oxazolium, triazolium, imidazolinium, methylpyrrolidinium, isothiazolium, isoxazolium, oxazolium, pyrrolium, and thiophenium, wherein when substituted, the substituent group may ~~comprise~~ be one or more of halo, alkyl, and aryl groups, and two adjacent substituents may be joined together to form an alkylene radical to form a ring structure converging on N, and in which the alkyl, phenyl and alkylene groups may be further substituted.

31. (Previously presented) The composition of Claim 30 wherein the quaternary ammonium cation is substituted by groups selected from the group consisting of alkyl and aryl groups.

32. (Previously presented) The composition of Claim 30 wherein the quaternary ammonium cation is BMIM (1-butyl-3-methylimidazolium).

33. (Previously presented) The composition of Claim 30 wherein the cation is tetrabutyl ammonium, tributylmethyl ammonium, tetrabutyl phosphonium, tetraethyl ammonium, N, N – dialkyl pyrrolidinium, trimethyl 2-hydroxyethyl ammonium, N, N' – dialkyl imidazolium, N-alkylpyridinium, or a mixture thereof.

34. (Previously presented) The composition of Claim 27 wherein the anion is Docusate (bis(2-ethylhexyl)sulfosuccinate diester).

35-36. (Cancelled)

37. (Currently amended) The composition of Claim 1 wherein the anion ~~has the chemical structure I~~ and is hydrophilic.

38. (Cancelled)

39. (Currently amended) The composition of Claim 1 wherein ~~the anion has the chemical structure I~~ and the ionic liquid is hydrophobic.

40. (Cancelled)

41. (Original) The composition of Claim 1 wherein the anion is selected from the group consisting of the anions of (i) di-n-cyclohexyl ester of sulfosuccinic acid; (ii) di-n-octyl ester of sulfosuccinic acid; (iii) di-n-butyl ester of sulfosuccinic acid; (iv) di-isobutyl ester of sulfosuccinic acid; (v) di-neopentyl ester of sulfosuccinic acid; (vi) di-n-heptyl ester of sulfosuccinic acid; and (vii) di-n-heptyl ester of sulfosuccinic acid.

42. (Original) The composition of Claim 41 wherein the cation is tetrabutyl ammonium.

43. (Currently amended) An ionic liquid composition, comprising ~~at least about 55~~ greater than 70 weight percent of an ionic liquid comprising:

- (a) a quaternary ammonium, phosphonium or sulfonium cation; and
- (b) an anion having the following structure:



III

wherein R_1 , R_2 , R_3 , R_4 , and R_5 are independently selected from the group consisting of a hydrogen atom and a carbon-containing group;
and wherein the ionic liquid has a melting point that is less than about 100°C.

44. (Original) The composition of Claim 43, wherein R_1 is 2-ethylhexyl, R_2 is ethyl, R_3 is a methylene group, R_4 is ethyl, and R_5 is 2-ethylhexyl.

45. (Original) The composition of Claim 44, wherein the cation is tetrabutyl ammonium.

46. (Original) The composition of Claim 44, wherein the cation is 1-methyl-3-hexyl imidazolium.

47. (Original) The composition of Claim 43, wherein R_1 is 2-ethylhexyl, R_2 is a hydrogen atom, R_3 is a methylene group, R_4 is a hydrogen atom, and R_5 is 2-ethylhexyl.

48. (Original) The composition of Claim 47, wherein the cation is tetrabutyl ammonium.

49. (Original) The composition of Claim 47, wherein the cation is 1-methyl-3-hexyl imidazolium.

50. (Original) The composition of claim 43, further comprising a hydrocarbon.

51. (Previously presented) The composition of claim 1, wherein the cation and the anion form a molten salt having a melting point of less than about 100°C, the molten salt being selected from the group consisting of tetrabutylammonium docusate, MeBu₃N docusate, Me₃N(CH₂)₆NMe₃ docusate, Bu₄P docusate, Et₄N docusate, 1-hexyl-3-methyl imidazolium docusate, 1-octyl-3-methyl imidazolium bromide docusate, 1-butyl-3-methyl imidazolium docusate, and 1-methyl-2-ethyl imidazolium docusate, wherein docusate is bis(2-ethylhexyl)sulfosuccinate diester.

52. (Previously presented) A composition comprising:
(a) an ionic liquid comprising an anion that is selected from the group consisting of (i) docusate, (ii) an anion of a bis(organo)ester derivative of sulfosuccinic acid, and (iii) an anion of a bis(organoamide) derivative of sulfosuccinic acid and a quaternary ammonium, phosphonium or sulfonium cation ; and
(b) CO₂ at supercritical conditions;
wherein the ionic liquid is dissolved in the CO₂.

53-56. (Cancelled)

57. (Previously presented) The ionic liquid composition of claim 1 wherein the ionic liquid melts at a temperature range that is greater than about 40° C but less than about 80° C.

58. (Previously presented) A composition, comprising:
a first ionic liquid combined with a second ionic liquid,
(a) the first ionic liquid comprising:
(i) a cation selected from the group consisting of quaternary ammonium, sulfonium, and phosphonium cations, said cation being non-tetrahedrally symmetric;

- (ii) an anion having the formula Al_yR_{3y+1} wherein y is greater than 0 and R is independently selected from the group consisting of an alkyl group and halogen group;
- (b) the second ionic liquid comprising an anion that is selected from the group consisting of (i) docusate, (ii) an anion of a bis(organo)ester derivative of sulfosuccinic acid, and (iii) an anion of a bis(organoamide) derivative of sulfosuccinic acid.
59. (Original) The composition of claim 58, further comprising reactants, the first and second ionic liquids being an effective reaction solvent for the reactants.
60. (New) The composition of claim 1 comprising greater than 80 weight percent of the ionic liquid.
61. (New) The composition of claim 27 comprising greater than 80 weight percent of the ionic liquid.
62. (New) The composition of claim 43 comprising greater than 80 weight percent of the ionic liquid.
63. (New) The composition of claim 1 wherein the anion and the cation are present in stoichiometric amounts.
64. (New) The composition of claim 27 wherein the anion and the cation are present in stoichiometric amounts.
65. (New) The composition of claim 43 wherein the anion and the cation are present in stoichiometric amounts.